at least one horizontal interconnect layer, wherein interconnects in said interconnect layer electrically connect said vertically oriented carbon nanotube.

66. (New) A patterned array comprising:

a plurality of CNMEDs;

wherein each said CNMED includes at least one carbon nanotube; and

wherein said CNMEDs are located according to the location of templates in a substrate layer.

71 cont.

67. (New) A template in a substrate, said template being adapted to contain and determine the shape of a carbon nanotube as the carbon nanotube is created.

68. (New) The template of claim 67, wherein said template has been oxidized.

69. (New) The template of claim 67, wherein said template has been nitridized.

70. (New) The template of claim 67, wherein said template is at least partially electrically isolated from the substrate.

71. (New) A carbon nanotube in a substrate, said carbon nanotube having been created in a template such that the shape of the carbon nanotube conforms to the shape of the template.

72. (New) The carbon nanotube of claim 71, wherein the template has been oxidized.

73. (New) The carbon nanotube of claim 71, wherein the template has been nitridized.

74. (New) The carbon nanotube of claim 71, wherein the template is at least partially electrically isolated from the substrate.

75. (New) A process of creating a carbon nanotube comprising:

creating a template in a substrate, wherein the template has a template shape; and

creating a carbon nanotube in the template, wherein the shape of the carbon nanotube conforms to the template shape.

76. (New) A method of creating a carbon nanotube comprising:

creating a template within a substrate; and

creating the carbon nanotube in the template, wherein the shape of the carbon nanotube conforms to the shape of the template.

A1 cont.

77. (New) A process of etching a template comprising:

designating etching process parameters to achieve a desired template shape; and

etching the template within a substrate, wherein the etching process parameters are used to control the template's shape.

78. (New) The process of claim 77, wherein control of the template's shape comprises control of the template's diameter along its depth.

79. (New) The process of claim 77, wherein said etching the template comprises etching the template electrochemically.

80. (New) The process of claim 77, wherein said etching the template comprises etching the template photoelectrochemically.

81. (New) The process of claim 77, wherein the substrate material comprises a member of the class consisting of silicon, aluminum, and gallium arsenide.

82. (New) The process of claim 77, further comprising:

oxidizing the template.

83. (New) The process of claim 77, further comprising:

nitridizing the template.

84. (New) The process of claim 77, further comprising:

processing the template so that the template is at least partially electrically isolated from the substrate.

85. (New) The process of claim 84, wherein processing the template comprises oxidizing the template.

86. (New) The process of claim 84, wherein processing the template comprises nitridizing the template.

87. (New) The process of claim 77, wherein said etching is performed using etchant, and wherein the etching process parameters are a function of the depth of penetration of the etchant.

88. (New) The process of claim 87, wherein the etchant comprises diluted hydrofluoric acid.

89. (New) The process of claim 77, wherein the template comprises a plurality of segments, and wherein at least two template segments with different shapes are created in series.

90. (New) The process of claim 77, wherein the template comprises a plurality of segments, and wherein at least two template segments are created in parallel, whereby the template shape includes at least two branches.

91. (New) The process of claim 77, wherein said etching includes:

applying current flux to etch the substrate; and

controlling the current flux as a function of time, wherein the shape of the template is determined at least in part by the current flux.

92. (New) A template in a substrate, wherein said template has a shape including at plurality of template segments, and wherein at least two of the template segments have different shapes.

93. (New) The template of claim 92, wherein the difference of shape between the at least two of the template segments comprises a difference of diameters along said template's vertical axis.

94. (New) A template in a substrate, wherein said template has a shape including at least two different branches, whereby each of at least two of the branches have a unique vertical axis relative to the other.

A' cont

95. (New) A carbon nanotube in a substrate, wherein said template has a shape including at plurality of carbon nanotube segments, and wherein at least two of the carbon nanotube segments have different shapes.

96. (New) The carbon nanotube of claim 92, wherein the difference of shape comprises a difference of diameters along said carbon nanotube's vertical axis.

97. (New) A carbon nanotube in a substrate, wherein said carbon nanotube has a shape including at least two different branches, whereby each of at least two of the branches have a unique vertical axis relative to the other.

98. (New) A process of etching a substrate comprising:

providing an upper substrate layer;

providing a lower substrate layer;

providing a metal layer below the upper substrate layer and above the lower substrate layer;

etching a template such that the template penetrates the upper substrate layer, the metal layer, and the lower substrate layer.

99. (New) The process of claim 98, wherein the metal layer comprises patterned lines.

100. (New) The process of claim 98, wherein the metal layer comprises a blanket deposit.

101. (New) A template penetrating an upper substrate layer, a metal layer, and a lower substrate layer,

wherein the metal layer is below the upper substrate layer and above the lower substrate layer; and

wherein said template is adapted to contain and determine the shape of a carbon nanotube as the carbon nanotube is created.

A1 cont

102. (New) The process of claim 101, wherein the metal layer comprises patterned lines.

103. (New) The process of claim 101, wherein the metal layer comprises a blanket deposit.

104. (New) A carbon nanotube penetrating an upper substrate layer, a metal layer, and a lower substrate layer,

wherein the metal layer is below the upper substrate layer and above the lower substrate layer; and

wherein said carbon nanotube has been created in a template such that the shape of the carbon nanotube conforms to the shape of the template.

105. (New) The process of claim 104, wherein the metal layer comprises patterned lines.

106. (New) The process of claim 104, wherein the metal layer comprises a blanket deposit.

107. (New) A carbon nanotube including a discontinuity, whereby there are two different conducting regions, one on either side of the discontinuity, and whereby the carbon nanotube comprises a diode.

108. (New) The carbon nanotube of claim 107, wherein said carbon nanotube is in a substrate.

109. (New) The carbon nanotube of claim 108, wherein said carbon nanotube further comprises:

an integrated source electrode; and

an integrated drain electrode.

110. (New) An electronic device, comprising:

a first terminal;

a second terminal;

a substrate comprising a template structure extending between said first terminal and said second terminal;

a carbon nanotube formed within the template structure, wherein said carbon nanotube has at least one discontinuity therein, wherein the at least one discontinuity provides a first region and a second region, wherein the first region's conductivity differs from the second region's conductivity, wherein the first region is electrically connected to said first terminal, and wherein the second region is electrically connected to said second terminal.

111. (New) A patterned array of carbon nanotubes in a substrate, wherein the carbon nanotubes are interconnected.

112. (New) A patterned array of carbon nanotubes, wherein the carbon nanotubes are located at selected locations in a substrate, wherein the locations of the carbon nanotubes correspond to the locations of templates in a patterned array of templates in a substrate.

113. (New) Two carbon nanotubes in a substrate comprising:

a first carbon nanotube;

a second carbon nanotube;

wherein said second carbon nanotube has a shape including at least two different diameters along said second carbon nanotube's vertical axis; and

wherein said first carbon nanotube is in electrical connection with said second carbon nanotube at a contact point such that said first carbon nanotube and said second carbon nanotube are interconnected.

114. (New) Two carbon nanotubes in a substrate comprising:

a first carbon nanotube;

a second carbon nanotube; and

wherein said first carbon nanotube and said second carbon nanotube are vertically stacked and in electrical connection such that they are interconnected.

A' cncl.

115. (New) A vertically oriented carbon nanotube, wherein said vertically oriented carbon nanotube is created in a substrate, wherein said vertically oriented carbon nanotube includes a plurality of discontinuities along said vertically oriented carbon nanotube, wherein said vertically oriented carbon nanotube comprises a plurality of CNMEDs.

116. (New) A CNMED comprising:

at least one vertically oriented carbon nanotube; and

at least one horizontal interconnect layer comprising horizontal conductive-only carbon nanotubes, wherein the horizontal conductive-only carbon nanotubes electrically connect said vertically oriented carbon nanotube.

Should any additional fees be required under 37 C.F.R. §§ 1.16 to 1.21 for any reason relating to the enclosed materials, the Assistant Commissioner is authorized to deduct said fees from Thompson & Knight, L.L.P.'s Deposit Account No. 20-0821/500929.000008.

Respectfully submitted,

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